

A Study of Visual Contents Production Using Mixed Reality Technology

Ryosuke Ichikari

Mixed reality, which can merge real and virtual worlds in real-time, is used widely in various fields such as architecture, urban design, and industrial design because it is able to overcome a limitation of virtual reality. Recently, mixed reality has attracted much attention, especially in the field of art, entertainment, and education, as a novel method for interactive presentation. To be used for practical purpose in such fields, it is important to offer a technology platform of presentations and interactions for creators of mixed reality attraction. This paper describes two approaches for visual contents production using mixed reality technology. The first approach is to develop representation methods used in interactive visual contents. The second approach uses mixed reality technology for improving the efficiency of conventional visual contents creation such as filmmaking and TV program production. Regarding the first approach, the approximate expression method is proposed for realizing visual effects used in visual contents in mixed reality under real-time constraints in Chapter 2. As an example, falling petals of cherry blossoms are picked up. The presentation of the falling petals is approximated by using a stochastic process instead of physical simulation. The method is able to generalize for presenting the other falling natural objects such as autumn leaves and snow. In the second approach, a mixed reality based previsualization method for filmmaking, called MR-PreViz, is proposed in Chapter 3. In this chapter the workflow of filmmaking using the MR-PreViz is definitized. A Camera-Work Authoring Tool is developed as the most important tool in the MR-PreViz. Additionally, a description language for camera-work, called camera-work markup language (CWML), is proposed. CWML has the ability to describe both quantitative and qualitative elements derived from breaking camera-work down into patterns. In Chapter 4, a real-time relighting method is proposed for intentionally changing and designing lighting in the MR-PreViz images. The relighting method is able to add lighting effects to both real and virtual objects while keeping photometric consistency. The relighting method is also applicable for the use in real-time MR attraction. Therefore, the method also applies to the first approach.

Keywords:

mixed reality, staging effects, physics-based modeling, real-time rendering, pre-visualization, filmmaking, camera-work, relighting, photometric consistency